Curriculum Content Framework

HVACR II

Grade Level: 12	Prerequisites: HVACR II
CIP Code: 47.0201	Course Code: 47.233

Course Description: An instructional program that prepares individuals to apply technical knowledge and skills to repair, install, service and maintain the operating condition of heating, air conditioning, and refrigeration systems.

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Unit 1: Residential & Light Commercial System Design

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.1 (match) Terms related to system design with definitions		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
1.2 (list) Structural and space considerations in system design		Thinking	Knowing How To Learn	Applies new knowledge and skills to list structural and space consideration in system design [4.3.1]
1.3 (explain) Structural and space considerations in system design	1.3.1 Solve problems concerning equipment location in system design	Thinking	Problem Solving Reasoning	Interprets drawings to solve design problems [4.4.7] Comprehends ideas and concepts related to structural and space considerations in system designs [4.5.2]
1.4 (list) Control requirements in system design		Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]
1.5 (explain) Control requirements in system design	1.5.1 Differentiate control requirements and effects on system design	Thinking	Knowing How To Learn Reasoning	Applies new knowledge and skills to explain control requirements in system design [4.3.1] Comprehends ideas and concepts related to differentiating control requirements and effects on system designs [4.5.2]
1.6 (list) Factors that ceiling design has on system design		Thinking	Knowing How To Learn	Applies new knowledge and skills to list factors ceiling design has on system design [4.3.1]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.7 (explain) How ceiling design affects system design	1.7.1 Solve practical problems concerning how ceiling design will affect system design	Thinking	Problem Solving Reasoning	Interprets drawing to solve design problems [4.4.7] Comprehends ideas and concepts related to how ceiling design affects system design [4.5.2]
1.8 (list) Factors of air distribution		Thinking	Reasoning	Comprehends ideas and concepts related to factors of air distribution [4.5.2]
1.9 (explain) How factors of air distribution affect system design	1.9.1 Solve problems concerning air distribution and its effect on system design	Thinking	Problem Solving	Comprehends ideas and concepts related to air distribution and effects on system design [4.4.1] Draws conclusions from observations, evaluates conditions and gives possible solutions [4.4.5]
1.10 (list) Noise factors		Thinking	Reasoning	Comprehends ideas and concepts related to noise factors [4.5.2]
1.11 (explain) How noise factors affects system design	1.11.1 Analyze factors and relationship to system design	Thinking	Problem Solving	Comprehends ideas and concepts related to air noise factors effects on system design [4.4.1] Draws conclusions from observations, evaluates conditions and gives possible solutions [4.4.5]
1.12 (list) Factors for odor control effects on system design		Thinking	Problem Solving	Comprehends ideas and concepts related to list factors for odor controls effects on system design [4.4.1]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.13 (explain) Factors of odor control and effects on system design	1.13.1 Analyze odor control factors and system design	Thinking	Problem Solving	Comprehends ideas and concepts related to factors of odor control and effects on system design [4.4.1]
			Reasoning	Uses logic to draw conclusions from available information [4.5.6]
1.14 (list) Effects of fire codes and system design		Thinking	Reasoning	Comprehends ideas and concepts related to effects of fire codes and system design [4.5.2]
1.15 (state) Relationship of ire code requirements and choice of system design	1.15.1 Solve given problems on fire codes and system design	Thinking	Problem Solving	Draws conclusions from what is read and give possible solutions [4.4.4]
			Reasoning	Uses logic to draw conclusions from available information [4.5.6]
1.16 (list) Different types of filters as related to different system design	1.16.1 Match filters to system design	Thinking	Knowing How To Learn	Applies new knowledge and skills to list different types of filters as related to system design [4.3.1]
		Thinking	Reasoning	Sees relationship between two or more ideas, objects or situations [4.5.5]
1.17 (list) Factors concerning humidification and system design		Thinking	Reasoning	Comprehends ideas and concepts related to factors concerning humidification and system design [4.5.2]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.18 (explain) New factors concerning humidification and system design	1.18.1 Match humidification factors to appropriate system design	Thinking	Knowing How To Learn Reasoning	Applies new knowledge and skills to list factors concerning humidification and system design [4.3.1] Sees relationship between two or more ideas, objects or situations [4.5.5]
1.19 (list) Electrical considerations in system design		Thinking	Knowing How To Learn	Applies new knowledge and skills to list electrical considerations in system design [4.3.1]
1.20 (explain) How electrical considerations affect system design	1.20.1 Use electrical considerations to choose appropriate system design	Thinking	Problem Solving Reasoning	Demonstrates logical reasoning in reaching a conclusion [4.4.2] Comprehends ideas and concepts related to how electrical considerations affect system design [4.5.2]
1.21 (list) Types of duct materials		Thinking	Knowing How To Learn	Applies new knowledge and skills to list types of duct materials [4.3.1]
1.22 (explain) Effect of duct materials on system design		Thinking	Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2]
1.23 (explain) The method of sizing duct	1.23.1 Calculate size of duct	Foundation	Arithmetic/ Mathematics	Applies computation skills to calculate size of duct [1.1.5] Comprehends mathematical ideas and concepts related to method of sizing duct [1.1.13]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.24 (review) Mathematical calculations necessary for determining information for ducts	1.24.1 Calculate velocity of air flowing in duct	Foundation	Arithmetic/ Mathematics	Applies computation skills to calculate velocity of air flowing in duct [1.1.5] Comprehends mathematical ideas and concepts related to method of sizing duct [1.1.13]
	1.24.2 Calculate volume of air flowing in duct	Foundation	Arithmetic/ Mathematics	Applies computation skills to calculate volume of air flowing in duct [1.1.5]

Unit 2: Residential and Light Commercial Load Calculations

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.1 (define) Terms related to residential and light commercial load calculations		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
2.2 (explain) The value of standardized load calculations		Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]
2.3 (list) Factors in determining heat loss and heat gain		Foundation	Science	Acquires and processes scientific data [1.4.1]
2.4 (explain) Factors of heat loss and heat gain	2.4.1 Calculate heat loss and heat gain for a residence using entire house	Foundation	Arithmetics/ Mathematics Science	Calculates/Estimates heat loss and heat gain on a residence using entire house [1.1.8] Applies scientific principles related to explaining factors of heat loss and heat gain [1.4.5]
2.5 (list) Steps in calculating heat transfer multiplier	2.5.1 Calculate heat transfer multipliers	Thinking	Knowing How To Learn	Applies new knowledge and skills to list steps in calculating heat transfer multipliers [4.3.1] Uses available resources to apply new skills [4.3.6]
2.6 (list) Factors to consider when sizing heating equipment		Thinking	Knowing How To Learn	Applies new knowledge and skills to list factors of consideration when sizing heating equipment [4.3.1]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.7 (explain) Factors to consider when sizing heating equipment	2.7.1 Choose what size heating equipment would be necessary for various given factors	Foundation Thinking	Science Knowing How To Learn	Chooses appropriately from a variety of scientific methods and techniques to complete a practical task [1.4.9] Applies new knowledge and skills to explain factors necessary when sizing heating equipment [4.3.1]
2.8 (list) Factors to consider when sizing cooling equipment		Thinking	Knowing How To Learn	Applies new knowledge and skills to consider when sizing cooling equipment [4.3.1]
2.9 (explain) Factors necessary to consider when sizing cooling equipment	2.9.1 Choose correct size cooling equipment to match a given set of factors	Foundation Thinking	Science Reasoning	Chooses appropriately from a variety of scientific methods and techniques to complete a practical task [1.4.9] Comprehends ideas and concepts related to factors of consideration for sizing cooling equipment [4.5.2]
2.10 (list) Ways structural modifications can affect equipment selection		Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]
2.11 (list) Factors concerning sources of heat gain in light commercial		Thinking	Knowing How To Learn	Processes new information as related to workplace [4.3.5]
2.12 (explain) How factors from commercial considerations affect heat gain		Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.13 (list) Factors concerning winter humidification load in commercial setting		Thinking	Knowing How To Learn	Processes new information as related to workplace [4.3.5]
2.14 (explain) Factors concerning winter humidification load in commercial setting	2.14.1 Select appropriate winter humidification necessary for a commercial setting	Thinking	Decision Making Reasoning	Evaluates information/data to make best decision [4.2.5] Comprehends ideas and concepts related to winter humidification load factors in commercial settings [4.5.2]
2.15 (list) Factors concerning U valves		Foundation	Reading	Identifies relevant details, facts and specifications [1.3.16]
2.16 (explain) Effects of U values on commercial load calculations		Thinking	Reasoning	Sees relationship between two or more ideas, objects, or situations [4.5.5]
2.17 (state) Procedures presented in manual N for load calculations		Thinking	Reasoning	Extracts rules or principles from written information [4.5.4]
2.18 (name) Considerations presented in manual N or load calculations in light commercial setting		Foundation	Reading	Comprehends written information and applies it to a task [1.3.8]

Unit 3: Residential and Light Commercial Air Treatment

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.1 (define) Terms related to air treatment		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
3.2 (list) Air contaminants that affect humans		Foundation	Science	Identifies relevant details, facts and specifications [1.3.16]
3.3 (explain) How air contaminants affect humans	3.3.1 Distinguish how air contaminants and their effects on humans affect the HVACR industry	Foundation	Science	Analyze environmental issues (ecology, pollution , waste management) [1.4.2] Describes/Explains scientific principles related to effect of air contaminants on humans [1.4.14]
3.4 (list) Factors which affects humidity in a residence		Foundation	Science	Applies scientific principles related to factors which affect humidity in a residence [1.4.5]
3.5 (explain) How humidity affects a residence	3.5.1 Analyze factors necessary to determine maintaining proper humidity in a residence	Foundation	Science	Analyze environmental issues (ecology, pollution , waste management) [1.4.2] Describes/Explains scientific principles related to how humidity affects a residence [1.4.14]
3.6 (list) Common types of residential filtering equipment		Foundation	Science	Applies knowledge to complete a practical task [1.4.3]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.7 (explain) Operations of different types of filtering equipment	3.7.1 Match operations to specific types of residential filtering equipment	Thinking	Decision Making Knowing How To Learn	Evaluates information/data to make best decision [4.2.5] Applies new knowledge and skills to explain operations of different types of filtering equipment [4.3.1]
3.8 (state) Purpose of a dehumidifier		Thinking	Reasoning	Comprehends ideas and concepts related to purpose of a dehumidifier [4.5.2]
3.9 (explain) Uses of a dehumidifier	3.9.1 Relate operations of a dehumidifier to air treatment	Foundation Thinking	Science Reasoning	Describes/Explains scientific principles related to explaining uses of a dehumidifier [1.4.14] Sees relationship between two or more ideas, objects or situations [4.5.5]
3.10 (state) Purpose of a humidifier with a forced air furnace		Thinking	Reasoning	Comprehends ideas and concepts related to purpose of a humidifier with a forced air furnace [4.5.2]
3.11 (explain) Operation of a humidifier with a forced air furnace	3.11.1 Evaluate effects of air treatment by use of humidifier with a forced air furnace	Thinking	Problem Solving Seeing Things In The Mind's Eye	Tracks and evaluates results [4.4.10] Imagines the flow of work activities from narrative descriptions [4.6.1]
3.12 (list) Common problems of air-to-air exchanger		Thinking	Problem Solving	Recognizes/Defines problem [4.4.8]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.13 (explain) Common problems of air-to-air exchanger	3.13.1 Solve problems concerning air-to-air exchanger by selecting best solutions	Thinking	Problem Solving	Draws conclusions from what is read and gives possible solutions [4.4.4] Identifies possible reasons for problem [4.4.6]
3.14 (state) Concerns of radon in air treatment		Foundation	Science	Analyzes environmental issues (ecology, pollution, waste management) [1.4.2]
3.15 (explain) Federal and state guidelines for monitoring radon	3.15.1 Produce a plan for monitoring radon	Foundation Thinking	Reading Problem Solving	Identifies relevant details, facts and specifications [1.3.16] Devises and implements a plan of action to resolve problem [4.4.3]

Unit 4: Residential & Light Commercial Duct Design and Sizing

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.1 (match) Terms related to duct design and sizing		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
4.2 (list) Types of supply duct systems		Thinking	Reasoning	Comprehends ideas and concepts related to types of supply duct systems [4.5.2]
4.3 (identify) Types of supply duct systems	4.3.1 Label different supply duct systems	Thinking	Reasoning	Determines which conclusions are correct when given a set of facts and a set of conclusions [4.5.3] Uses logic to draw conclusions from available information [4.5.6]
4.4 (state) Factors affecting system design		Thinking	Knowing How To Learn	Processes new information as related to workplace [4.3.5]
4.5 (explain) Effects factors have on system design	4.5.1 Distinguish factors affecting system design to the effects on the system	Thinking	Problem Solving Reasoning	Demonstrates logical reasoning in reaching a conclusion [4.4.2] Sees relationship between two or more ideas, objects or situations [4.5.5]
4.6 (list) Major steps in air system design		Thinking	Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.7 (explain) Major steps in air design	4.7.1 Match major steps in air design system with their procedures	Thinking	Reasoning	Comprehends ideas and concepts related to explanation of major steps in air design [4.5.2]
4.8 (list) Factors affecting return air duct design		Thinking	Knowing How To Learn	Applies new knowledge and skills to list factors affecting return air duct design [4.3.1]
4.9 (explain) How factors affect return air duct design	4.9.1 Match factors affecting return air duct design to effects	Thinking	Reasoning	Comprehends ideas and concepts related to how factors affect return air duct design [4.5.2] Sees relationship between two or more ideas, objects or situations [4.5.5]
4.10 (list) Four locations of registers and grilles		Thinking	Problem Solving	Comprehends ideas and concepts related to listing four locations of registers and grilles [4.4.1]
4.11 (state) Advantages and disadvantages for locations of registers and grilles	4.11.1 Solve given problems by stating solution using facts related to location of registers and grilles	Thinking	Decision making Problem Solving	Identifies pros and cons to assist in decision making [4.2.7] Draws conclusions from observations, evaluates conditions and gives possible solutions [4.4.5]
4.12 (name) Climate zones		Foundation	Science	Acquires and processes scientific data [1.4.1]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.13 (list) Conditions of each climate zone	4.13.1 Differentiate climate zones and conditions	Foundation	Science	Applies knowledge to complete a practical task [1.4.3] Applies scientific principles related to climate zones and conditions [1.4.5]
4.14 (name) Air control devices		Foundation	Reading	Identifies relevant details, facts and specifications [1.3.16]
4.15 (explain) Applications of air control devices	4.15.1 Match air control devices with their applications	Foundation	Science	Applies scientific principles related to climate zones and conditions [1.4.5] Describes/Explains scientific principles related to applications of air control devices [1.4.14]
4.16 (list) Factors to consider in the distribution of conditioned air		Foundation	Science	Acquires and processes scientific data [1.4.1]
4.17 (explain) How factors affect the distribution of conditioned air		Foundation	Science	Describes/Explains scientific principles related to factors affecting distribution of conditioned air [1.4.14]
4.18 (state) Grille design factors		Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]
4.19 (explain) Grille design factors		Foundation	Writing	Communicates thoughts, ideas or facts in written form in a clear, concise manner [1.6.6]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.20 (state) Types of outlet placements		Thinking	Reasoning	Comprehends ideas and concepts related to types of outlet placements [4.5.2]
4.21 (explain) Reasons for different recommended velocities by outlet placement	4.21.1 Match outlet placement with recommended velocities	Thinking	Reasoning	Sees relationship between two or more ideas, objects or situations [4.5.5] Uses logic to draw conclusions from available information [4.5.6]
4.22 (name) Types of air duct calculators		Thinking	Knowing How To Learn	Applies new knowledge and skills to name types of air duct calculators [4.3.1]
4.23 (explain) Advantages and disadvantages of different types of air duct calculators	4.23.1 Demonstrate use of one type of air duct calculator	Foundation Thinking	Arithmetic/ Mathematics Decision Making	Operates technical equipment to reach mathematical conclusions [1.1.30] Identifies pros and cons to assist in decision making [4.2.7]

Unit 5: Psychometrics for Residential and Light Commercial HVACR

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.1 (define) Terms related to psychometrics		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
5.2 (state) Basic information located on a psychometric chart		Foundation	Reading	Uses graphs/charts/tables to obtain factual information [1.3.21]
5.3 (explain) Procedures for preparing psychometric charts		Foundation	Reading	Comprehends written specifications and applies them to a task [1.3.9]
5.4 (identify) The location of dry-bulb temperature readings		Foundation	Science	Acquires and processes scientific data [1.4.1]
5.5 (identify) The location of wet-bulb temperature readings		Foundation	Science	Acquires and processes scientific data [1.4.1]
5.6 (identify) The location of dew point readings	5.6.1 Determine dew point when only dry-bulb and wet-bulb temperature are known	Foundation	Science	Acquires and processes scientific data [1.4.1] Applies knowledge to complete a practical task [1.4.3]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.7 (identify) The location of relative humidity readings	5.7.1 Prepare a psychometric chart to show location of relative humidity reading	Foundation	Science	Acquires and processes scientific data [1.4.1] Applies knowledge to complete a practical task [1.4.3]
5.8 (explain) Relative humidity	5.8.1 Determine relative humidity of a conditioned space	Foundation	Science	Applies knowledge to complete a practical task [1.4.3] Describes/Explains scientific principles related to explanation of relative humidity [1.4.14]
5.9 (name) Three basic cumulative psychometric processes		Thinking	Knowing How To Learn	Applies new knowledge and skills to name three basic cumulative psychometric processes [4.3.1]
5.10 (identify) A sling psychrometer		Foundation	Science	Applies knowledge to complete a practical task [1.4.3]
5.11 (list) Considerations for operation of a sling psychrometer		Thinking	Problem Solving	Comprehends ideas and concepts related to considerations for operations of a sling psychrometer [4.4.1]

Unit 6: Balance Points

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
6.1 (define) Terms related to balance points		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
6.2 (list) Words for acronym COP		Foundation	Reading	Identifies relevant details, facts and specifications [1.3.16]
6.3 (explain) Concept of COP	6.3.1 Distinguish between the COP of a direct electrical heating element and the COP of a heat pump	Foundation Thinking	Reading Reasoning	Applies information to job performance [1.3.4] Sees relationship between two or more ideas, objects or situations [4.5.5]
6.4 (explain) Relationship of balance points and COP		Thinking	Reasoning	Sees relationship between two or more ideas, objects or situations [4.5.5]
6.5 (name) Typical stages in heat continuity		Thinking	Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2]
6.6 (explain) Stages in heat continuity	6.6.1 Match balance points with stages of heat continuity	Thinking	Reasoning	Comprehends ideas and concepts related to explanation of stages in heat continuity [4.5.2] Sees relationship between two or more ideas, objects or situations [4.5.5]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
6.7 (state) Factors necessary to plot balance points	6.7.1 Plot balance points from given design conditions	Foundation Thinking	Arithmetic/ Mathematics Knowing How To Learn	Uses basic numerical concepts in practical situations [1.1.32] Applies new knowledge and skills to state factors necessary to plot balance points [4.3.1]
6.8 (list) Procedure for sizing a heat pump		Thinking	Seeing Things In The Mind's Eye	Imagines the flow of work activities from narrative descriptions [4.6.1]
6.9 (explain) Procedure for sizing a heat pump	6.9.1 Size a heat pump on the cooling load	Thinking	Seeing Things In The Mind's Eye	Imagines the flow of work activities from narrative descriptions [4.6.1]
		Foundation	Arithmetic/ Mathematics	Computes using a formula [1.1.14]
6.10 (state) Advantages of controlled heating stages		Thinking	Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2]
6.11 (name) Installation considerations to heat pump performance		Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]

Unit 7: Customer Relations - Ethics, Environment and Problem Solving

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
7.1 (match) Terms relative to HVACR customer relations with their definitions		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
7.2 (list) Ways good personal habits contribute to good customer relations	7.2.1 Compare correlation of good personal habits to good customer relations	Interpersonal Personal Management	Customer Service Integrity/Honesty/ Work Ethic	Comprehends ideas and concepts related to ways personal habits contribute to good customer relations [2.3.2] Describe desirable worker characteristics [3.2.3]
7.3 (state) General rules in dealing with customers	7.3.1 Select true statements concerning basic rules for service calls	Interpersonal	Customer Service	Applies human relations skills in real-life situations [2.3.1] Comprehends ideas and concepts related to ways personal habits contribute to good customer relations [2.3.2]
7.4 (state) Basic rules for service calls	7.4.1 Select true statements concerning basic rules for service calls	Interpersonal	Customer Service	Applies human relations skills in real-life situations [2.3.1] Comprehends ideas and concepts related to ways personal habits contribute to good customer relations [2.3.2]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
7.5 (name) Ways to turn service calls into good customer relations opportunities	7.5.1 Complete statements concerning ways to turn service calls into good customer relations opportunities	Interpersonal	Customer Service	Comprehends ideas and concepts related to ways personal habits contribute to good customer relations [2.3.2] Establishes positive first impressions with customers [2.3.4]
7.6 (state) Ways to handle an irritated customer		Interpersonal	Customer Service	Maintain positive relations with customer [2.3.6]
7.7 (cite) Ways vehicle operations affect customer relations	7.7.1 Solve problems concerning ways to earn a customer's respect	Thinking	Problem Solving Reasoning	Draws conclusions from observations, evaluates condition and gives possible solution [4.4.5] Sees relationship between two or more ideas, objects or situations [4.5.5]
	7.7.2 Analyze problem situations with a plan of action to promote good customer relations	Thinking	Problem Solving	Devises and implements a plan of action to solve problems [4.4.3]

Unit 8: The VICA Student Organization

This unit should be integrated throughout the vocational course in which it is taught

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.1 (describe) The purpose of VICA		Foundation	Reading	Draws conclusions from what is read [1.3.12]
			Writing	Communicates thoughts, ideas, or facts in written form in a clear, concise manner [1.6.6]
		Personal Management	Organizational Effectiveness	Promotes the goals and values of the organization [3.3.8]
8.2 (delineate) A brief history of the VICA organization		Foundation	Reading	Comprehends written information and applies it to a task [1.3.8]
			Writing	Presents answers/conclusions in a clear and understandable form [1.6.13]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
8.3 (identify) The types of VICA memberships		Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.16]
			Writing	Summarizes written information [1.6.17]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.4 (recite) The VICA pledge		Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
8.5 (explain) The VICA motto		Foundation	Reading	Draws conclusions from what is read [1.3.12]
			Writing	Summarizes written information [1.6.17]
		Personal Management	Organizational Effectiveness	Promotes the goals and values of the organization [3.3.8]
8.6 (state) The VICA creed		Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.7 (list) The VICA clothing requirements		Foundation	Reading	Comprehends written information and applies it to a task [1.3.8]
			Writing	Presents answers/conclusions in a clear and understandable form [1.6.13]
		Personal Management	Organizational Effectiveness	Identifies characteristics desired by organization [3.3.6]
8.8 (explain) The representation of the VICA colors		Foundation	Reading	Comprehends written information for main ideas [1.3.7]
			Writing	Communicates thoughts, ideas, or facts in written form in a clear, concise manner [1.6.6]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
8.9 (identify) The offices of VICA		Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.16]
			Writing	Summarizes written information [1.6.17]
		Interpersonal	Leadership	Comprehends ideas and concepts related to VICA offices [2.4.2]
		Personal Management	Organizational Effectiveness	Comprehends the organization's modes of operation [3.3.5]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.10 (delineate) The duties of each officer of VICA		Foundation	Reading	Comprehends written information for main ideas [1.3.7]
			Writing	Communicates thoughts, ideas, or facts in written form in a clear, concise manner [1.6.6]
		Interpersonal	Leadership	Comprehends ideas and concepts related to VICA offices [2.4.2]
		Personal Management	Organizational Effectiveness	Identifies characteristics desired by organization [3.3.6]
8.11 (list) The seven parts of the opening and closing ceremonies	8.11.1 Demonstrate each of the seven parts of the opening and closing ceremonies	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
		Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.12 (recite) One part of the opening ceremony		Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
8.13 (recite) One part of the closing ceremony		Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.14 (identify) The requirements for a club to legally conduct business	8.14.1 Demonstrate the procedures necessary to complete a business meeting, from call to order through adjournment, as outlined in a VICA USSO regulations guide	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
			Teamwork	Works effectively with others to reach a common goal [2.6.6]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
		Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]
8.15 (define) Parliamentary procedure		Foundation	Reading	Draws conclusions from what is read [1.3.12]
			Writing	Summarizes written information [1.6.17]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.16 (identify) The parts of a club business motion	8.16.1 Make a motion in a simulated club business meeting	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
			Teamwork	Works effectively with others to reach a common goal [2.6.6]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
		Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]
	8.16.2 Make an amendment to a motion during a simulated club business meeting	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
			Teamwork	Works effectively with others to reach a common goal [2.6.6]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
		Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.17 (identify) The four classifications of motions	8.17.1 Demonstrate the four classifications of motions within the context of a simulated club business meeting	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Leadership	Conveys attitudes and values of group to others [2.4.3]
			Teamwork	Works effectively with others to reach a common goal [2.6.6]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
		Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]
8.18 (identify) The equipment and materials needed for a VICA club business meeting as outlined by the USSO regulations guide		Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.16]
			Writing	Presents answers/conclusions in a clear and understandable form [1.6.13]
		Personal Management	Organizational Effectiveness	Identifies characteristics desired by organization [3.3.6]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.19 (describe) The VICA professional development program		Foundation	Reading	Draws conclusions from what is read [1.3.12]
			Writing	Communicates thoughts, ideas, or facts in written form in a clear, concise manner [1.6.6]
		Interpersonal	Leadership	Comprehends ideas and concepts related to VICA professional development program [2.4.2]
8.20 (identify) The items in the VICA National Program of Work		Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.16]
			Writing	Summarizes written information [1.6.17]
		Personal Management	Organizational Effectiveness	Comprehends the organization's modes of operation [3.3.5]
8.21 (list) Traits which an employer considers desirable in a worker		Foundation	Reading	Comprehends written information and applies it to a task [1.3.8]
			Writing	Presents answers/conclusions in a clear and understandable form [1.6.13]
		Personal Management	Integrity/Honesty/ Work Ethic	Describes desirable worker characteristics [3.2.3]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.22 (list) Traits which fellow workers consider desirable in a co-worker		Foundation Personal Management	Reading Writing Integrity/Honesty/ Work Ethic	Identifies relevant details, facts, and specifications [1.3.16] Summarizes written information [1.6.17] Describes desirable worker characteristics [3.2.3]
8..23 (list) General safety rules which all employees should follow		Foundation Personal Management	Reading Science Integrity/Honesty/ Work Ethic	Identifies relevant details, facts, and specifications [1.3.16] Follows safety guidelines [1.4.16] Follows established rules, regulations, and policies [3.2.5]
8.24 (identify) Sources of potential employment		Foundation Personal Management	Reading Writing Career Awareness, Development, and Mobility	Draws conclusions from what is read [1.3.12] Summarizes written information [1.6.17] Explores career opportunities [3.1.6]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.25 (identify) Abbreviations used in job listings		Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.16]
			Writing	Uses language, style, organization, and format appropriate to subject matter, purpose, and audience [1.6.19]
		Personal Management	Career Awareness, Development, and Mobility	Comprehends ideas and concepts related to job listings [3.1.3]
8.26 (describe) Items given as fringe benefits		Foundation	Reading	Comprehends written information for main ideas [1.3.7]
			Writing	Presents answers/conclusions in a clear and understandable form [1.6.13]
		Personal Management	Career Awareness, Development, and Mobility	Comprehends ideas and concepts related to fringe benefits [3.1.3]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.27 (state) The parts of a letter of application	8.27.1 Write a letter of application	Foundation	Reading	Applies information to new situations [1.3.5]
			Writing	Uses language, style, organization, and format appropriate to subject matter, purpose, and audience [1.6.19]
		Personal Management	Self-Esteem	Creates a positive self-image by selling self in a letter of application [3.5.2]
		Thinking	Knowing How to Learn	Processes new information as related to workplace [4.3.5]
8.28 (delineate) The elements of a standard resume	8.28.1 Write a resume	Foundation	Reading	Comprehends written information and applies it to a task [1.3.8]
			Writing	Uses language, style, organization, and format appropriate to subject matter, purpose, and audience [1.6.19]
		Personal Management	Self-Esteem	Develops self-confidence by creating a resumé which promotes personal strengths/abilities [3.5.5]
		Thinking	Knowing How to Learn	Processes new information as related to workplace [4.3.5]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.29 (state) The information normally requested on a job application	8.29.1 Complete a job application	Foundation	Reading	Determines what information is needed [1.3.10]
			Writing	Completes form accurately [1.6.7]
		Personal Management	Organizational Effectiveness	Applies knowledge to implement work-related system or practice [3.3.4]
		Thinking	Knowing How to Learn	Processes new information as related to workplace [4.3.5]
	8.29.2 Determine the discriminatory items on a job application	Foundation	Reading	Determines what information is needed [1.3.10]
		Personal Management	Career Awareness, Development, and Mobility	Comprehends ideas and concepts related to job applications [3.1.3]
		Thinking	Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2]

VOCATIONAL and TECHNICAL SKILLS What the Student Should Be Able To Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.30 (explain) The parts of a job interview	8.30.1 Participate in a simulated job interview	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Interpersonal	Teamwork	Works effectively with others to reach a common goal [2.6.6]
		Personal Management	Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1]
		Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]